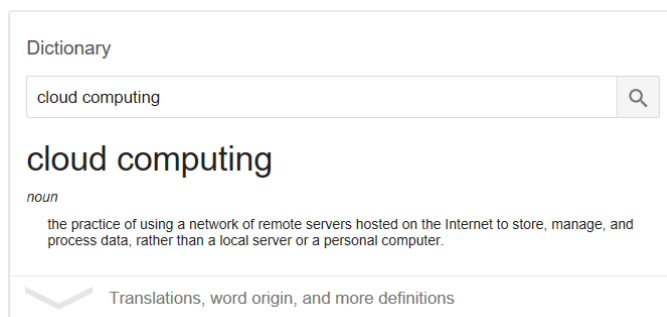


Agenda: Introduction to Cloud Computing

- What is Cloud Computing.
- Cloud Characteristics.
- Cloud Computing Service Models.
- Deployment Models in Cloud Computing.
- Advantages and Disadvantages of Cloud Computing.
- Cloud Computing Job Roles.
- Cloud Computing Platforms and Certifications.

What is Cloud Computing?

- **Cloud** is just a metaphor for the internet, when we say cloud, we are just referring to internet.
- In the simplest terms, **cloud computing** means storing and accessing data and programs over the Internet instead of our local computer's hard drive.



- The phrase **cloud computing** means "**a type of Internet-based computing**" where different services — such as servers, storage and applications — are delivered to an organization's computers and devices through the **Internet**.
- Cloud Computing refer to a variety of **services** available over the Internet that deliver computing functionality on the **service provider's infrastructure**. One has to just **rent** it to use the same.
- The computing services offered tend to vary by cloud provider. However, typically they include:
 - **Compute power** - such as Windows and Linux virtual machines
 - **Storage** - such as object storage
 - **Applications** - such as NoSQL or SQL database applications
 - **Networking** - such as setting up virtual networks for your virtual machines
 - **Analytics** - such as visualizing telemetry, and performance data
- A cloud computing service consists of highly **optimized data centers** (third party data centers from the end user point of view), that provide various hardware, software and information resources (when needed).
- Cloud platform **hide the complexity** and details of the underlying infrastructure from users and applications by providing very simple graphical interface or API (Applications Programming Interface).

- The Cloud platform provides **on demand services** that are **always on, anywhere, anytime and anyplace**.

Why are businesses moving to cloud?

In traditional hosting, a software company has to deal with licensing costs, protection of data, frequent upgrades to latest technologies, maintenance and up gradation of hardware and most important finding the right skillsets at the right time.

Cloud Characteristics

Characteristics of Cloud computing that distinguish it from **traditional hosting**.

- ➔ **Remotely hosted:** Services or data are hosted on remote infrastructure.
- ➔ **Ubiquitous:** Services or data are available from anywhere through internet.
- ➔ **Resiliency:** Cloud providers generally mirrors solutions to multiple data centers to minimize downtime in the event of a disaster.
- ➔ **On-demand self-service:** A consumer can himself provision computing capabilities, such as server time and network storage, as needed automatically without requiring human interaction with each service's provider. It is sold on demand mostly by the minutes or hours. (Pay as you go model)
- ➔ **Rapid elasticity** – A user can utilize as much or little of the cloud service as required. For example resources (ex: web servers) on the cloud can be scaled to meet high traffic in peak times or scaled down in times of less traffic.
- ➔ **Broad network access.** Capabilities are available over the network and accessed through standard mechanisms that promote use by heterogeneous thin or thick client platforms (e.g., mobile phones, laptops, and PDAs).
- ➔ **Fully managed by the provider / It's current** - The user is abstracted from the details of how the service is managed in the cloud. For example the user need not worry about aspects such as hardware used, software updates and patches, plug-ins, web security. There is optimum utilization of resources and as well as sharing of resources. Everything is taken care of by the provider.

Cloud Computing Service Models

Cloud Computing = Software as a Service (SaaS)

+ Platform as a Service (PaaS)

+ Infrastructure as a Service (IaaS)

1) **IaaS** (Infrastructure as a Service):

- a. Delivers computer infrastructure, typically a platform virtualization environment as a service.
- b. Cloud providers build datacenters, managing power, scale, hardware, networking, storage, distributed systems, etc...

- c. Rather than purchasing servers, software, data center space or network equipment, clients instead buy those resources as a fully outsourced service.
- d. Eg: Amazon Web Services(AWS), Rackspace Hosting, VMWare, Citrix, Azure, Google Cloud

2) **PaaS** (Platform as a Service):

- a. Provides **developer's** necessary tools to create, test, host and maintain created applications.
- b. Cloud providers offer an Internet-based platform to developers who create services but don't want to build their own cloud.
- c. Ex: Microsoft Azure App Service, AWS Bean Stalk.

3) **SaaS** (Software as a Service):

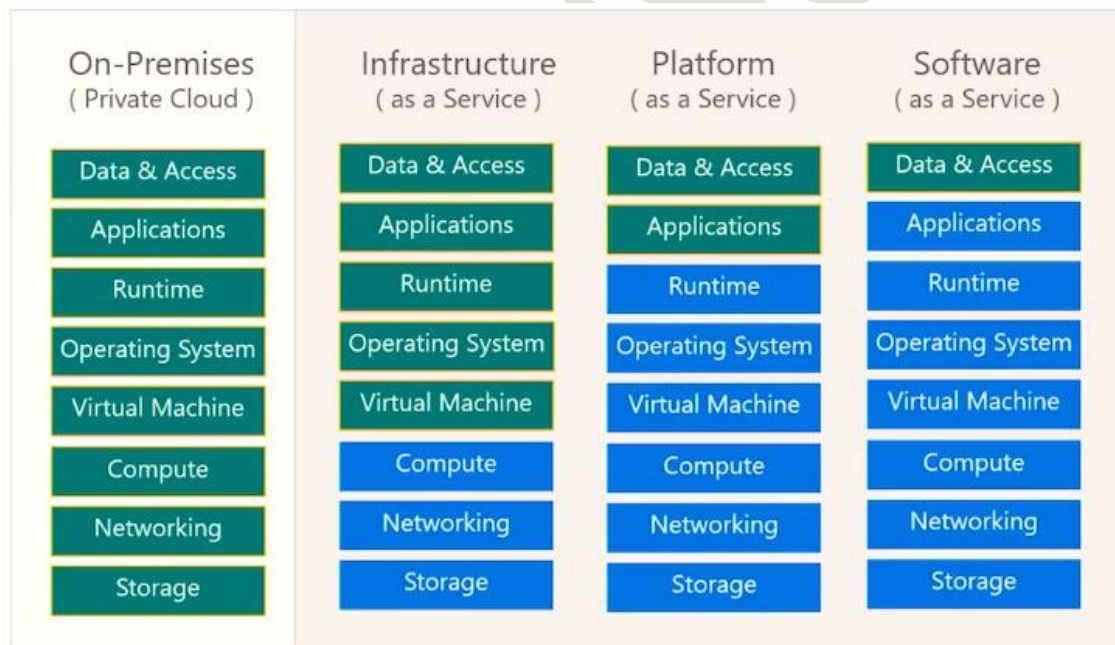
- a. SaaS is a software delivery methodology that provides licensed multi-tenant access to software and its functions remotely as a Web-based service.
- b. From **end user's** point of view apps are located in the cloud and it is almost always accessible through a web browser.
- c. Any application hosted on a remote server that can be accessed over the Internet is considered as SaaS.
- d. Usually billed based on usage and a multi-tenant environment.
- e. Ex: Microsoft 365, Gmail, Google Apps (Office like features), Sales Force CRM

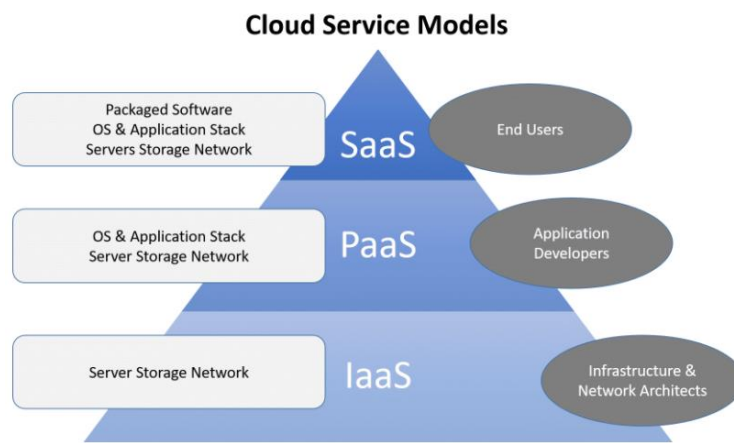
IaaS	PaaS	SaaS
<ul style="list-style-type: none">• The most flexible cloud service.• You configure and manage the hardware for your application.	<ul style="list-style-type: none">• Focus on application development.• Platform management is handled by the cloud provider.	<ul style="list-style-type: none">• Pay-as-you-go pricing model.• Users pay for the software they use on a subscription model.

Do you Use the Cloud?



The following picture neatly summarizes the functionality of the three service models of the cloud.





Deployment Models in Cloud Computing

There are three main deployment models in Cloud Computing.

1. **Public Cloud:**

- These are the clouds which are open for **use by general public** and they exist beyond the firewall of an organization, fully hosted and managed by vendors.
- Your data is stored in the provider's data center and the provider is responsible for the management and maintenance of the data center.
- Because you are sharing computing resources among a network of users, the public cloud offers greater flexibility and cost savings.
- This is good option if your demand for computing resources fluctuates. You have to purchase the capacity on the basis of usage and can scale up or scale down server capabilities based on traffic and other dynamic requirements.
- This type of cloud environment is appealing to many companies because it reduces lead times in testing and deploying new products.
- Cons: They are more vulnerable than private clouds and there is no control of resources used or who shares them.

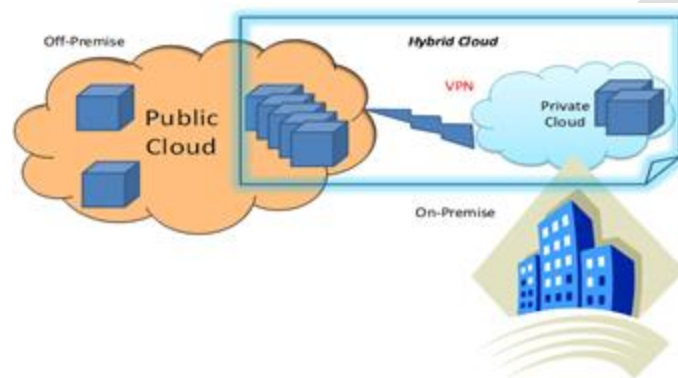
Note: Even though you don't control the security of a public cloud, all of your data remains separate from others and security breaches of public clouds are extremely rare.

2. **Private Cloud:**

- A private cloud hosting solution, also known as an **internal** or **enterprise** cloud, resides on company's intranet or hosted data center where all of your data is protected behind a firewall.
- This can be a great option for companies who already have expensive data centers because they can use their current infrastructure.
- You go for a private cloud when you have strict **security and data privacy** issues.
- Cons: The main drawback people see with a private cloud is that all management, maintenance and updating of data centers is the responsibility of the company.

3. Hybrid Clouds:

- They consist of external and internal providers, namely a mix of public and private clouds.
- Secure & critical apps are managed by an organization and the not-so-critical & secure apps by the third party vendor. For example, you can use a public cloud to interact with the clients but keep their data secured within a private cloud. Most companies are now switching to Hybrid clouds.
- Ideal in situations where you have plans are to migrate to a complete cloud solution as existing hardware expires or you have some applications or hardware that are not ready for the cloud.



Advantages and Disadvantages of Public Cloud

Advantages of Cloud Computing:

1. It's cost-effective because of Pay-as-you-go or consumption-based pricing model.
2. Improved Performance as its scalable both vertical and horizontal scaling.
3. Reduced Software Cost and Instant Software Updates.
4. Unlimited Storage Capacity because of virtualization.
5. Universal Document Access as cloud providers have fully-redundant datacenters spread over the world.
6. Increased data reliability. Cloud computing providers offer data backup, disaster recovery, and data replication services to make sure your data is always safe.
7. It's Secure in both aspects – Physical security and Digital Security.

Disadvantage of Public Cloud Computing:

1. Requires a constant Internet connection.
2. Does not work well with low-speed connections.
3. Features might be limited based on provider you choose.
4. Can be slow.
5. Stored data might not be secure.
6. **If your data is stored abroad whose policy do you adhere to?**

Cloud Computing Job Roles**It's raining jobs in Cloud!**

- Companies of all sizes are moving in greater numbers to the cloud while cloud providers continue to grow their operations to support more and more workloads.
- An IDC report released in 2012 estimated a worldwide growth of **14 million Cloud based jobs** by the end of 2015.
- There are about **100 jobs** chasing each **qualified** candidate at this point in time, according to technical recruiters.

With cloud many roles will be redefined or replaced with new roles.**1. Cloud System Engineer / I.T. Professional / Administrators (AZ-104)****

- a. 70% IaaS + 30% PaaS
- b. Responsible to implement and operate the Virtual Systems that support the cloud implementation.
- c. To build and configure Virtual Network and provision Virtual Machines, Storage Accounts, Databases, Network Load Balancer, Gateways etc.
- d. They're responsible for the scale-in/scale-out infrastructure.
- e. Should have system engineering experience, holistic understanding of the Internet and hosting from the network layer up through the application layer.
- f. Should have experience in 24x7 hosting environment.
- g. Should have knowledge of using maintaining and monitoring tools, scripting, configuration manager tools, network security, firewalls etc...

2. Application Developers / Software Engineer (AZ-204)**

- a. 70% PaaS + 30% IaaS
- b. Responsible for design and development of different types of software applications that integrate with cloud service providers.
- c. Developers can take advantage of managed services such as databases, storages, queues, caches, workflows, and more to bring new applications to market quicker and cheaper than ever before.
- d. They need to understand how these managed services can be used to build highly available, fault tolerant and scalable applications.
- e. Increasingly, job requirements for developer opportunities are adding Cloud Computing as a must-have skill.
- f. **Required credentials:** Computer Science engineering with 2+ years of professional experience in software development. Must have excellent understanding of at least one language like C#, Java, PHP, Python etc.

3. DevOps Engineers (AZ-400)***

- a. Responsible for Automation of deployment and configuration of applications.
- b. DevOps represents a merger between development and operations. It breaks down the barrier of developers and operations engineers with the goal of streamlining the application lifecycle.
- c. The role often is responsible for managing the infrastructure through version-controlled source files that can be used to recreate Cloud environments in hours and minutes instead of weeks and days under the traditional model.
- d. DevOps is more attainable now than it ever has been with the ease of automation for infrastructure and software services, making it a natural choice for developers and/or system administrators with scripting experience.

4. Cloud Architect (AZ-305)***

- a. Should possess a strong understanding of how to **design** and build Cloud environments to ensure that systems are scalable, reliable, secure and supportable and that they achieve business performance and budgetary objectives.
- b. Their knowledge of a Cloud platform is broad enough to know which services are best suited for any particular situation including whether or not a hybrid environment makes sense.
- c. Should have significant experience designing, installing and administering virtualized environments.
- d. They lead migration projects to move companies into the Cloud.
- e. They design for disaster recovery and mitigation.
- f. They will be required in companies which build applications and/or infrastructure in the Cloud.
- g. There are various certifications that, when combined with experience, can help Cloud architects stand out. Additionally, they must stay update-to-date on the latest and greatest features of Cloud platforms to stay competitive in the market.
- h. **Required credentials:** Engineers with 8 to 10 years of experience dealing with large-scale, multi-platform networks, expert level knowledge of Linux and Windows OS. High level understanding or programming languages. Significant experience designing, installing and administering virtualized environments.